

Do ESG Ratings Affect Stock Prices? The Case of Developed and Emerging Stock Markets

Yavuz GÜL (<https://orcid.org/0000-0002-0208-6798>), *İstanbul Beykent University, Türkiye;*
yavuzgul@beykent.edu.tr

Ceren ALTUNTAŞ (<https://orcid.org/0000-0002-9071-2807>), *İstanbul Beykent University, Türkiye;*
cerenaltuntas@beykent.edu.tr

ESG Reytingleri Hisse Fiyatlarını Etkiler Mi? Gelişmiş ve Gelişen Hisse Senedi Piyasaları Örneği

Abstract

This paper examines the role of ESG ratings on stock returns. The sample covers 347 companies from 2010 to 2022 from advanced and emerging stock markets. Return on assets, debt to equity, price-to-book ratio, and price-to-earnings ratio were used as control variables, and panel regression analysis was employed. Results revealed that ESG rating and return on assets statistically positively influence stock market performance. When the components of ESG were tested individually, it was observed that E (environmental) and S (social) ratings positively affect the stock prices. However, no significant relationship was found between G (corporate governance) rating and returns. These findings indicate the importance of investing in stocks and prioritising environmental, social, and governmental concerns regarding portfolio selection decisions. Findings also provide new sights and show that firms, especially in emerging markets, might enhance their market values by paying attention to ESG practices.

Keywords : ESG, Sustainability, Stock Market, Portfolio Management, Panel Data Analysis.

JEL Classification Codes : C33, G11, G34, M14.

Öz

Bu çalışmada, ESG skorlarının hisse senedi getirileri üzerindeki rolü araştırılmaktadır. Gelişmiş ve gelişen hisse senedi piyasasından toplam 347 şirketin 2010-2022 dönemi verileri kullanılmıştır. Aktif kârlılığı, kaldıraç oranı, piyasa değeri / defter değeri ve fiyat / kazanç oranları kontrol değişkenleri olarak belirlenmiş ve panel regresyon analizi uygulanmıştır. Sonuçlar, ESG skorunun ve aktif kârlılığının hisse senedi piyasası performansını istatistiksel olarak anlamlı ve pozitif etkilediklerini ortaya koymuştur. ESG bileşenleri ayrı ayrı test edildiklerinde, E (çevresel) ve S (sosyal) skorlarının hisse fiyatları üzerinde olumlu etkilerinin bulunduğu fakat G (kurumsal yönetim) skoru ile getiriler arasında anlamlı bir ilişkinin olmadığı gözlemlenmiştir. Sağlanan sonuçlar, yatırımcıların çevresel, sosyal ve yönetim faaliyetlerine değer veren şirketlerin hisselerine yatırım yaparak portföy performanslarını artırabileceklerini işaret ederken, özellikle gelişen piyasalardaki şirketlerin ESG uygulamalarını ön planda tutarak piyasa değerlerini yükseltebileceklerini göstermektedir.

Anahtar Sözcükler : ESG, Sürdürülebilirlik, Hisse Senedi Piyasası, Portföy Yönetimi, Panel Veri Analizi.

1. Introduction

Global warming, climate change, air pollution, and waste management have started to drive the global agenda in recent years. This has increased "socially responsible investment" for countries and firms. Furthermore, concepts called "green economy" and "green finance" by academic communities have certainly come to the fore, and those concepts can be considered to be an intersection between the fields of economics and finance. While governments establish policies to achieve sustainable development through renewable energy transition, greenhouse - gas emission reduction and more efficient use of available resources, companies likewise invest more in environmental issues. In addition, firms have broadened the scope of their activities related to social equality, employee-human rights and corporate governance. They attempt to inform regulators, legislators, and investors transparently through sustainability reporting practices. Non-financial information disclosures regarding environmental, social and governance issues improve stakeholder communication.

The main research focus of green finance (or, in other words, sustainable finance) is the relationship between corporate sustainable performance and financial performance (Drempetic et al., 2020: 333). It is thought that integrating sustainability into business and management strategies is a tool to meet stakeholders' environmental and social expectations (Lokuwaduge & Heenetigala, 2017: 438). While only 20 companies issued sustainability reports in the 1990s, this number has increased to nearly 9000 as of 2016 (Amel-Zadeh & Serafeim, 2018: 87).

Socially responsible investing, also known as sustainable or ethical investing, includes non-financial factors, like environmental, social and corporate governance issues, in the decision-making processes (Dorfleitner et al., 2015: 451). Herein, the ESG rating of a firm is one of the key indicators to monitor and evaluate companies' social responsibility and sustainability activities. ESG ratings inform decision-makers about how companies manage sustainability risks and opportunities (Serafeim & Yoon, 2023: 1505). For investors, these scores can be a valuable tool to assess whether environmental and ethical issues have been given due importance. ESG factors are considered non-financial performance indicators and are associated with corporate governance, corporate social responsibility and business ethics (Kim & Li, 2021: 1). ESG ratings are divided into three sub-categories, namely, E (environmental) pillar score, S (social) pillar score and G (corporate governance) pillar score. Data providers from various sources, such as annual reports, sustainability reports and websites, calculate these ratings. Firstly, environmental, social and corporate governance scores are computed separately for each firm under evaluation. The total ESG rating is then calculated by averaging these pillars. While the environmental pillar focuses on resource use, emissions, environmentally friendly innovative products and waste management practices, the social pillar examines the firm's attitudes toward labour and human rights. The corporate governance pillar discusses issues related to ownership structure, board of directors' composition and general management policies (Refinitiv, 2022).

The growing number of market participants integrate ESG practices into the valuation models, and institutional investors, especially in developed markets, consider the firms' ESG profiles when constructing a portfolio (Feng et al., 2022). The capitalisation of ESG-focused portfolios in significant stock market indices exceeded 30 trillion US dollars as of 2019 (Broadstock et al., 2021: 1). According to the report published by the Wall Street Journal on June 24, 2019, investors have become more meticulous with stock selection, and they tend to increase the portfolio weight of the stocks that strongly attach importance to environmental - social issues (Díaz et al., 2021: 1). Pension funds and asset managers also pay attention to the companies' ESG practices when making investment decisions (Kim & Li, 2021: 1).

The main premise of the idea that ESG ratings can positively affect the stock market performance is the cost of capital model. Socially responsible investing can be perceived as increased transparency and enhancing corporate governance policies, and thus can decrease a firm's cost of capital (Buallay, 2019: 100). In response to pressure from regulatory authorities, non-governmental organisations and other stakeholders, many firms try to comply with environmental, social and other regulations and provide a clear and broader picture of the corporate social responsibility activities (Alareeni & Hamdan, 2020: 1409-1410). In other respects, resource allocation inefficiency may negatively impact profit margin and firms' operational activity, leading to decreased efficiency and a decline in firm value and stock price. For example, firms' effective environmental and air pollution policies positively affect stakeholders' perceptions. Still, the inefficient use of organisational resources allocated to corporate sustainability activities might negatively affect firm value. Increasing demand for sustainable products opens up new opportunities for companies or pushes firms to operate under harsh competitive conditions. Some incidents that happened in the past have shown that mismanagement of corporate social responsibility activities may have profound financial implications. The 2015 Volkswagen emissions scandal, which caused firm's share to lose 18% of its value, is a striking example of how the risks above may influence firm financial performance (La Torre et al., 2020: 1). Other examples include the Deepwater Horizon oil spill in 2010, which caused BP's stock price to drop more than 50% and the Fukushima Nuclear Disaster in 2011, which has wiped out 80% of TEPCO's market capitalisation (Capelle-Blancard & Petit, 2019: 543).

Since it can potentially affect the financial performance of firms and market stock price, sustainability reporting and publishing information to affect investor behaviours and perceptions are vital, making it necessary to investigate the relationship between ESG ratings and stock returns. The current paper explores ESG ratings' impact on stock performance with this purpose in mind. We use annual panel data of 347 firms listed in advanced and emerging stock markets from 2010:04 (April 2010) to 2022:04 (April 2022). The control variables include return on assets (ROA), debt to equity, price-to-book ratio (P/B) and price-to-earnings ratio (P/E). This paper contributes to existing literature in many ways. First, the findings of prior studies are extended using a large data set consisting of firms traded on developed and developing stock markets. Second, we provide evidence on whether the effect of ESG performance on stock price differs across market groups. Lastly, our empirical

results will help decision-makers, regulators, investors, and researchers understand the link between ESG scores and stock returns and learn more about ESG practices.

The first section is an introduction, and the rest of the paper is arranged as follows: Section two presents the literature review and develops hypotheses. Section three describes the data set and variables, while section four details the empirical results. Finally, section five provides conclusions and gives policy recommendations, limitations, and the scope for future research.

2. Related Literature and Hypotheses Development

The growing interest shown by stakeholders in corporate sustainability and corporate social responsibility activities has increased the number of empirical studies that focus on the relations between ESG ratings, firm value and stock market performance. The literature review demonstrates that studies report contradictory results about the relationship between ESG scores and stock returns. For instance, Deng & Cheng (2019), using data from China over 2015Q2-2019Q1, examined the connection between ESG ratings and stock performance by running panel regression and stated that ESG ratings positively affect stock returns. The authors also emphasised that the shares of private sector companies are more affected by the ESG ratings than those of public sector companies. Another study in China found that portfolios constructed with high ESG stocks outperform low ESG portfolios. Moreover, stocks with high ESG scores have better resilience in times of crisis, such as COVID-19 (Broadstock et al., 2021). In a similar study, Díaz et al. (2021) investigated the relationship between ESG ratings and stock performances in COVID-19. They revealed that high ESG-rated stocks provide returns higher than the benchmark index. Therefore, they concluded that ESG scores are of great importance during periods of crisis when volatile conditions prevail in the markets. Supporting these results, Engelhardt et al. (2021) analysed a unique data set of 1452 firms from 16 European countries and reported that high ESG stocks are less volatile and have higher returns. Using data from 235 banks over the period 2007-2016, Buallay (2019) show the positive impact of ESG ratings on the market value of firms. Azmi et al. (2021) also examined a sample of 251 banks from 2011 to 2017 from 44 emerging markets. They indicated that there is a non-linear relationship between ESG practices and the value of banks. On the contrary, based on firm-level data from 2003 to 2020, Luo (2022) claimed that stocks with low ESG scores earn higher returns than high ESG-rated stocks in the UK. According to Keçeli & Çankaya (2020), no statistically significant relation exists between ESG scores and stock market performance. Similar results were obtained by Halbritter & Dorfleitner (2015). The authors examined the relationship between ESG ratings and financial performance in the USA and found no significant differences in returns between high ESG portfolios and low ESG portfolios. La Torre et al. (2020) analysed the companies listed on the Eurostoxx50 index for 2010-2018 and suggested that stock returns were limitedly affected by ESG indicators. Investors are increasingly interested in social responsibility and corporate sustainability reporting. Some studies indicate a positive relationship between ESG ratings and stock prices. They also claim that investors attach importance to the effectiveness of these activities. So, based on the related

studies (Buallay, 2019; Deng & Cheng, 2019; Diaz et al., 2021), we test the following hypotheses:

H₁: There is a positive relationship between stock returns and ESG ratings.

H₂: A positive relationship exists between stock returns and environmental (E) ratings.

H₃: A positive relationship exists between stock returns and social (S) ratings.

H₄: A positive relationship exists between stock returns and corporate governance (G) ratings.

Most studies discuss ESG ratings' effects on firm financial performance. One line of research, El Khoury et al. (2023) examined the relationship between ESG scores and bank performance in the Middle East, North Africa and Türkiye. The researchers analysed the data of 46 banks and observed a positive relationship between ESG ratings and financial performance. Therewithal, they reported that the costs of ESG investments outweigh its benefits after a certain level. Kim & Li (2021) found similar results and claimed that ESG variables positively affect profitability and credit rating. A recent study by Mohammad & Wasiuzzaman (2021) focused on the impact of ESG reporting on firm performance using a dataset of 661 Malaysian firms from 2012 to 2017. It showed that ESG practices and disclosures enable more efficient use of a firm's resources and enhance firm performance. While Alareeni & Hamdan (2020) analysed companies listed on the S&P 500 index between 2009 and 2018 to reveal the positive influence of ESG ratings on firm performance, Şişman & Çankaya (2021) used the data of 26 firms for the period 2010-2017 and provided evidence that relation among ESG ratings and ROA is positive. These results align with Çetenak et al. (2022), who concluded that ESG scores positively impact ROE and Tobin's Q ratio. Shakil (2021) discussed the effects of ESG factors on firms' financial risks and suggested that a negative relationship exists between ESG performance and total risk. Eliwa et al. (2021) studied the connection between the cost of debt and ESG performance for firms in 15 European countries from 2005 to 2016. They indicated that lenders reward firms' good practices in ESG in terms of a lower cost of debt financing. In contrast to the abovementioned studies, Duque-Grisales & Aguilera-Caracuel (2021) found a statistically significant negative association between ESG scores and the financial performance of companies.

After that, many studies shed light on the effects of ESG news on companies. Capelle-Blancard & Petit (2019), for instance, argued that negative news negatively affected the firm market value. However, positive announcements do not influence the stock price. Similarly, Shanaev & Ghimire (2022) examined the impact of ESG rating updates on stock returns for 658 firms in the USA and reported that ESG rating upgrades yield abnormal returns of 0.5% per month while downgrades lead to negative abnormal returns. Some papers have also examined the ESG scores data providers offer. Dorfleitner et al. (2015) compared the ESG ratings of firms calculated by three major rating agencies for 2002-2012 and documented that both definitions of corporate social responsibility and ESG scores differ significantly. They also highlight that large companies are likelier to achieve higher ESG scores. Brandon

et al. (2021) analysed the data of firms listed on the S&P 500 index from 2010 to 2017. According to the authors, higher ESG rating disagreement is related to higher stock returns. On the other side, Dremptic et al. (2020) have looked at the impact of firm size in calculating a company's ESG rating. They emphasised that ESG scores are positively affected by size. Further, large-scale companies can allocate more resources to disclose their corporate social responsibility activities and thus receive higher ESG ratings than smaller firms. Finally, the only study investigating the relationship between ESG ratings and stock price crash risk is Feng et al. (2022). Using data from Chinese firms from 2009 to 2020, the authors discovered a statistically significant negative relationship between these two variables.

As seen from the abovementioned literature, only a few studies have examined the impact of ESG ratings on stock market performance. These were generally conducted using data from a single stock exchange. Hence, in the current study, we have used panel data from developed and emerging stock markets to lessen the gap in the extant literature. The following section describes the entire data set.

3. Data and Methodology

347 companies traded in benchmark indices of developed and developing stock markets were analysed over a period spanning from April 2010 to April 2022. Data availability was important in determining the study period, and the companies included. Moreover, the aim was to maximise the number of observations in the analyses. We have employed regressions using an unbalanced panel dataset due to the lack of data from different companies. The indices adopted in the study are shown in Table 1.

Table: 1
Firm Distribution across Indices

Country	Index	No of Companies	Country	Index	No of companies
Brazil	BOVESPA	37	Russia	MOEX	19
China	SSE100	15	South Korea	KRX100	51
France	CAC40	37	Türkiye	BIST100	22
Germany	DAX40	29	UK	FTSE100	74
India	NIFTY50	35	USA	DJIA	28

The companies' ESG ratings were considered the independent variable, and stock returns were the dependent variable. All analyses were performed based on the annual data. ESG data providers such as Thomson Reuters, Sustainalytics, MSCI and Bloomberg exist. The data used in this research were obtained from the Thomson Reuters (Refinitiv Eikon) database. Stock returns are calculated daily and then annualised, considering the number of trading days in the year. The control variables are the return on assets, debt to equity, price-to-book ratio and price-to-earnings ratio of the firms. All variables are described in Table 2.

Table: 2
Variables

Variables	Description
ESG	Numerical score that assesses environmental, social and governance performance of a firm
E	Numerical score that assesses the environmental performance of a firm
S	Numerical score that measures the social performance of a firm
G	Numerical score related to governance performance of a firm
AAR	Annualised average daily stock return
ROA	Net profit / Average total assets
LEV	Debt / Equity
P/B	Market capitalisation / Book value of equity
P/E	Share price / Earnings per share

Table 3 presents the variables' descriptives. Accordingly, the mean values of both ESG ratings and their subdimensions vary between 60 and 65. During the study period, the average stock return was 19.95%, the return on assets was 6.7%, the leverage ratio was 1.11, and the average price-to-book ratio was 3.31. Lastly, the companies' price-to-earnings ratio was 25.58.

Table: 3
Descriptive Statistics

Variables	Obs.	Mean	Std. dev.	Min.	Max.	Skewness	Kurtosis
ESG	3754	63.48244	19.38465	1.4300	95.4200	-0.7583338	3.036987
E	3754	62.94572	24.31337	0.0000	99.2300	-0.7754142	2.873069
S	3754	65.24869	22.82329	0.3700	98.5500	-0.7841889	2.855582
G	3754	61.56037	21.67921	1.0900	98.5600	-0.4329503	2.278829
AAR	3754	0.199614	0.380775	-0.7396	7.462849	3.797908	48.51944
ROA	3754	0.067012	0.067630	-0.0469	140.6120	8.607728	230.8764
LEV	3754	1.116068	1.889614	0.0000	52.9100	12.50169	274.4678
P/B	3754	3.325808	10.58299	0.1100	540.0126	37.12949	1790.888
P/E	3754	25.58156	81.99717	1.0227	3127.243	21.28249	639.1498

The panel regression method examined the relationship between ESG ratings and stock returns. The equations for the models are given below.

$$AAR_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 P/B_{it} + \beta_5 P/E_{it} + \varepsilon_{it} \quad (1)$$

$$AAR_{it} = \beta_0 + \beta_1 E_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 P/B_{it} + \beta_5 P/E_{it} + \varepsilon_{it} \quad (2)$$

$$AAR_{it} = \beta_0 + \beta_1 S_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 P/B_{it} + \beta_5 P/E_{it} + \varepsilon_{it} \quad (3)$$

$$AAR_{it} = \beta_0 + \beta_1 G_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 P/B_{it} + \beta_5 P/E_{it} + \varepsilon_{it} \quad (4)$$

where AAR_{it} is the average stock return. ESG_{it} is the firm's overall ESG score. E_{it} is the firm's environmental score. S_{it} refers to a firm's social score. G_{it} shows the firm's corporate governance score. ROA_{it} represents a return on assets, and LEV_{it} is the firm's leverage ratio. P/B_{it} is the price-to-book ratio. P/E_{it} is the price-to-earnings ratio. Finally, ε_{it} shows an error term.

4. Findings

We applied the Shapiro-Wilk (1965) test for normality. The results, as expected, indicate that variables do not follow a normal distribution, so Spearman coefficients were used in the analysis. The correlation matrix is shown in Table 4.

Table: 4
Correlations

	AAR	ESG	E	S	G	ROA	LEV	P/B	P/E
AAR	1.000								
ESG	-0.054**	1.000							
E	-0.051**	0.797**	1.000						
S	-0.041*	0.871**	0.665**	1.000					
G	-0.040*	0.702**	0.370**	0.448**	1.000				
ROA	0.165**	-0.093**	-0.185**	-0.074**	-0.060**	1.000			
LEV	-0.030	0.144**	0.168**	0.138**	0.080**	-0.400**	1.000		
P/B	0.232**	-0.028	-0.141**	-0.012	0.047**	0.516**	-0.024	1.000	
P/E	0.123**	0.012	-0.087**	0.029	0.051**	-0.053**	-0.090**	0.566**	1.000

Note: ** and * denote significance at 1% and 5%, respectively.

According to the correlation coefficients, a negative correlation between stock returns and ESG indicators is observed. In other words, returns and these variables move in the opposite direction. However, positive correlations appear between AAR, ROA, and P/B and P/E. Unsurprisingly, there were enormously significant positive correlations between ESG rating and its sub-categories. It can also be seen that the correlation between ESG rating and leverage ratio is statistically significant at the $p < 0.01$ level. On the other hand, all ESG indicators show negative correlations with ROA. Another salient result in the table above is that while environmental and social ratings negatively correlate with the price-to-book ratio, corporate governance ratings exhibit a significantly positive correlation. Herein, it would be appropriate to state that the correlation does not always imply causation. Therefore, additional tests should be performed to determine whether the variables significantly impact each other. To this end, panel regressions were carried out to continue the study.

The presence of cross-sectional dependence, heteroscedasticity, and autocorrelation problems must first be checked to estimate with panel regression models. Pesaran's (2004) CD test was applied for cross-sectional dependence (Table 5). Considering the p-values, the null hypothesis was rejected for all variables, and hypothesis H1 was accepted ($p = 0.000$), meaning there is a correlation across cross-sections.

Table: 5
Cross-Sectional Dependence Results

Variables	CD-test Statistics	p-value
AAR	71.677	0.000
ESG	265.094	0.000
E	97.568	0.000
S	247.657	0.000
G	101.534	0.000
ROA	64.35	0.000
LEV	20.023	0.000
P/B	26.997	0.000
P/E	64.74	0.000

When analysing panel data, heteroscedasticity, autocorrelation, and cross-sectional dependence should always be investigated. The existence of heteroscedasticity was assessed using the Modified Wald test. Table 6 illustrates the test results. Findings indicate the rejection of null hypotheses of no heteroscedasticity at the 1% significance level. Thus, it is concluded that heteroscedasticity exists in all models.

Table: 6
Heteroscedasticity Results

Model	Test Statistic	p-value
Model I	27086.27	0.0000
Model II	28057.50	0.0000
Model III	27480.82	0.0000
Model IV	28047.44	0.0000

Wooldridge's (2002) test was employed to detect the presence of autocorrelation in the models. As reported in Table 7, the null hypothesis of no autocorrelation was rejected at a 5% significance level.

Table: 7
Wooldridge Test for Serial Correlation

Model	Test Statistic	Prob > F
Model I	6.185	0.0134
Model II	6.239	0.0130
Model III	6.116	0.0139
Model IV	6.155	0.0136

Four different regression equations were estimated in the study. Hausman's (1978) test, F-test and Breusch-Pagan's (1980) LM test were applied to decide which panel regression model should be used. ESG rating is adopted as the independent variable in the first model, (E) rating is adopted as the independent variable in the second model, social (S) rating is adopted as the independent variable in the third model and corporate governance (G) rating is adopted as the independent variable in the last model. Results are shown in Table 8.

Table: 8
Selection of the Most Appropriate Method

Model	Test	Test Statistic	p-value
Model I	Hausman	78.32	Prob > chi2 = 0.0000
	F-test	1.39	Prob > F = 0.0000
	Breusch-Pagan LM	7.82	Prob > chibar2 = 0.0026
Model II	Hausman	87.11	Prob > chi2 = 0.0000
	F-test	1.44	Prob > F = 0.0000
	Breusch-Pagan LM	9.50	Prob > chibar2 = 0.0010
Model III	Hausman	77.68	Prob > chi2 = 0.0000
	F-test	1.40	Prob > F = 0.0000
	Breusch-Pagan LM	8.56	Prob > chibar2 = 0.0017
Model IV	Hausman	61.36	Prob > chi2 = 0.0000
	F-test	1.39	Prob > F = 0.0000
	Breusch-Pagan LM	10.05	Prob > chibar2 = 0.0008

As presented in the table above, the p-values of the Hausman and F-test were determined to be less than 0.05; hence, "fixed effects estimation" was adopted for all models. Results of the fixed-effects models with robust standard errors are shown in Table 9.

Table: 9
Panel Regression Results (Fixed Effect): Full Sample

	MODEL I	MODEL II	MODEL III	MODEL IV
ESG	0.0011* (2.04)			
E		0.0016** (3.34)		
S			0.0010* (2.11)	
G				0.0002 (0.57)
ROA	2.1037** (3.32)	2.0984** (3.32)	2.1050** (3.33)	2.1071** (3.30)
LEV	-0.0050 (-0.82)	-0.0056 (-0.88)	-0.0050 (-0.80)	-0.0044 (-0.74)
P/B	0.0012 (1.08)	0.0013 (1.15)	0.0012 (1.07)	0.0012 (1.07)
P/E	0.0001 (1.75)	0.0001 (1.75)	0.0001 (1.75)	0.0001 (1.77)
Constant	-0.0204 (-0.30)	-0.0477 (-0.78)	-0.0101 (-0.16)	0.0390 (0.67)
R ²	7.80%	8.00%	7.81%	7.70%
No. of obs.	3754	3754	3754	3754
No. of groups	347	347	347	347
F-stat	3.23**	4.25**	3.23**	3.15**

Note: ** and * denote significance at 1% and 5%, respectively. t-statistics are shown in the parentheses below each coefficient.

The results, summarised in Table 9, claim that ESG ratings have a statistically significantly positive effect on stock returns ($p < 0.05$). A unitary increase in ESG score leads to 0.001 increase in stock returns, while a unitary rise in return on assets brings about a 2.1 increase in stock returns. No statistically significant relationships were detected between other variables and stock market performance.

Considering the second model, in which environmental (E) rating is taken as the independent variable, it is observed that an increase in environmental score positively affects stock returns ($p < 0.01$). Like the first model, return on assets positively influences stock market returns ($p < 0.01$). In the third model, it is determined that social (S) rating ($p < 0.05$) and return on assets ($p < 0.01$) have a significant impact on stock returns. According to the last model, unlike environmental and social factors, it is noteworthy that the corporate governance factor has no significant influence on stock returns ($p > 0.05$). On the other side, however, results confirm a positive relationship between return on assets and stock returns at a 1% significance level.

In the following section, firms traded in developed and emerging stock exchanges were analysed separately to investigate whether the impact of ESG ratings on stock returns differed by stock markets. The regression results based on a panel of 219 firms are reported (Table 10). Referring to the Breusch-Pagan LM and F-test, pooled OLS was the most appropriate model for estimating regression.

Table: 10
Panel Regression Results (Pooled OLS): Developed Indices

	MODEL I	MODEL II	MODEL III	MODEL IV
ESG	-0.0019** (-4.78)			
E		-0.0011** (-3.42)		
S			-0.0014** (-4.10)	
G				-0.0013** (-4.49)
ROA	0.6764** (5.29)	0.6593** (5.15)	0.6959** (5.41)	0.6978** (5.40)
LEV	-0.0120* (-2.35)	-0.0125* (-2.46)	-0.0118* (-2.33)	-0.0129* (-2.55)
P/B	0.0018 (1.89)	0.0018 (1.92)	0.0018 (1.87)	0.0019 (1.95)
P/E	0.0001 (1.38)	0.0001 (1.35)	0.0001 (1.41)	0.0001 (1.27)
Constant	0.2673** (8.60)	0.2157** (7.86)	0.2313** (8.43)	0.2208** (9.20)
R ²	3.60%	3.05%	3.27%	3.13%
No. of obs.	2350	2350	2350	2350
No. of groups	219	219	219	219
F-stat	15.43**	13.24**	14.27**	15.38**
Hausman (Prob > chi2)	0.6438	0.2662	0.4369	0.5764
Wooldridge (Prob > F)	0.7969	0.7951	0.7997	0.7998
Wald (Prob > chi2)	0.0000	0.0000	0.000	0.0000

Note: ** and * denote significance at the 1% and 5%, respectively. t-statistics are shown in parentheses below each coefficient.

As the table above summarises, a negative relation exists between ESG ratings and stock returns ($p < 0.01$). One unit increase in ESG rating lowers the stock returns by 0.001. Along with this finding, leverage ratio also has a negative impact on stock market returns ($p < 0.05$). On the contrary, a positive relationship is found between return on assets and returns ($p < 0.01$). The estimated coefficients for P/B and P/E are not statistically significant ($p > 0.05$).

While all sub-dimensions of ESG are negatively related to stock returns ($p < 0.01$), ROA has a positive effect at the 1% significance level. The P/B ratio was found to be statistically insignificant in all models. These results reveal that ESG ratings, ROA and leverage ratio play a crucial role in the stock performance of firms traded in advanced stock markets.

Table 11 illustrates the outputs obtained by applying fixed-effects regressions to panel data of 128 firms listed on emerging stock markets.

Table: 11
Panel Regression Results (Fixed Effect): Emerging Indices

	MODEL I	MODEL II	MODEL III	MODEL IV
ESG	0.0029** (3.72)			
E		0.0026** (3.88)		
S			0.0022** (3.42)	
G				0.0015* (2.16)
ROA	2.4770** (4.36)	2.4769** (4.33)	2.4795** (4.37)	2.4915** (4.35)
LEV	-0.0050 (-0.68)	-0.0057 (-0.75)	-0.0052 (-0.67)	-0.0037 (-0.55)
P/B	0.0093 (1.12)	0.0093 (1.10)	0.0093 (1.10)	0.0094 (1.14)
P/E	0.0002 (1.13)	0.0002 (1.12)	0.0002 (1.14)	0.0002 (1.18)
Constant	-0.1303 (-1.84)	-0.1075 (-1.65)	-0.0951 (-1.42)	-0.0565 (-0.88)
R ²	16.17%	16.33%	16.09%	15.72%
No. of obs.	1404	1404	1404	1404
No. of groups	128	128	128	128
F-stat	6.19**	6.34**	5.73**	6.26**
Hausman (Prob > chi2)	0.0000	0.0000	0.0000	0.0000
Wooldridge (Prob > F)	0.2940	0.3227	0.2932	0.2987
Wald (Prob > chi2)	0.0000	0.0000	0.0000	0.0000

Note: ** and * denote significance at the 1% and 5%, respectively. t-statistics are shown in parentheses below each coefficient.

For Model I, the ESG rating was adopted as the independent variable. Results indicate that ESG rating positively correlates with stock returns ($p < 0.01$). The second model specification in Table 11 shows that the relationship between environmental rating and returns is positive and statistically significant ($p < 0.01$). Social performance is also essential in predicting stock returns, as shown in Model III. Finally, a positive relation between corporate governance rating and stock market performance at a 5% level is confirmed. These findings do not coincide with the results of the previous analyses that found a negative relationship between ESG ratings and returns. Lastly, ROA has a positive impact on stock returns ($p < 0.01$), while leverage does not affect the share price ($p > 0.05$).

Next, following Azmi et al. (2021), Deng & Cheng (2019), and Eliwa et al. (2021), we applied a two-step system generalised method of moments (2S-GMM) developed by Blundell & Bond (1998) to address endogeneity concerns. Results are presented in Table 12. Our findings are consistent with those in Tables 9, 10 and 11. A firm's ESG rating positively impacts stock market performance over the full sample ($p < 0.05$). Return on assets and price-to-earnings ratio also positively affect the share price ($p < 0.01$). The second column of the table provides evidence for a significant and negative influence of ESG and leverage on stock returns. Returns are positively affected by return on assets, price-to-book, and price-to-earnings, in contrast to the findings above. For emerging stock markets, ESG scores and ROA coefficients are significantly positive at the 5% level, meaning that a one-unit increase in ESG and ROA leads to 0.001 and 1.8299 increase in stock returns, respectively.

Table: 12
Endogeneity Tests

	Full Sample	Advanced Stock Markets	Emerging Stock Markets
ESG	0.0010*	-0.0020**	0.0014*
ROA	1.8967**	0.7356**	1.8299**
LEV	0.0059	-0.0236**	0.0112
P/B	-0.0000	0.0024*	0.0068
P/E	0.0004**	0.0003*	0.0001
Constant	0.1306**	0.2753**	0.0099
No. of obs.	3467	2164	1303
No. of groups	347	219	128
Wald chi2	70.95	94.82	37.27
Prob > chi2	0.000	0.0000	0.0000
Hansen statistic	56.31	11.97	5.41
Estimator	2S-GMM	2S-GMM	2S-GMM

Note: ** and * denote significance at 1% and 5%, respectively.

To sum up, it can be argued that ESG practices predict stock returns positively. Environmental and social ratings play a crucial role in determining the performance of stocks. However, no significant relationship is found between corporate governance factors and stock returns for the entire sample. Even though ESG ratings have little impact on stock market performance, effective management of issues such as waste reduction, carbon emissions, clean energy, recyclable materials and human-employee rights is essential for companies. Thus, the share price can be increased by creating value in the eyes of investors.

5. Concluding Remarks

ESG ratings generally cover environmental, social, and corporate governance activities and assess the firms based on their perspectives. Worldwide, there is an increasing interest in environmental and social issues. Therefore, ESG scores offered by different data providers have become indicators that many stakeholders, especially investors and portfolio-asset managers, have started to follow with interest. While investors examine whether ESG ratings significantly influence stock returns, firms try increasing management transparency by disclosing non-financial and financial information to market stakeholders. Therefore, the interaction of firms with their environment will increase, and this situation will positively impact financial performance.

The possible effects of ESG ratings on stock returns were investigated using a large data set covering 347 firms listed on various stock markets. The resulting data set spans the period from 2010 to 2022. ROA, leverage ratio, P/B and P/E are used as control variables. The panel data analysis showed that ESG ratings positively influence stock returns ($p < 0.05$). Accordingly, a 1% increase in ESG scores causes a 0.001 increase in stock returns. This finding aligns with previous studies' findings (Buallay, 2019; Deng & Cheng, 2019; Broadstock et al., 2021; Díaz et al., 2021; Engelhardt et al., 2021). Furthermore, ROA is associated positively with stock market performance, but no relationship was observed between leverage, P/B and P/E with stock returns ($p > 0.05$). While environmental (E) and social (S) ratings positively affect stock returns, the corporate governance (G) score has no impact on the share price. All models detected other variables as insignificant ($p < 0.05$).

The full sample is then divided into two groups, and each of the subgroups is analysed individually. Based on the results of the regressions, it was determined that stocks in developed indices are negatively related to ESG ratings ($p < 0.01$). On the contrary, ESG scores have a statistically significant positive impact ($p < 0.01$) on returns in emerging stock markets. One can claim that firms traded in advanced markets place more importance on ESG activities and corporate social responsibility reporting. At the same time, investors think long-term and sacrifice stock returns for companies that embrace corporate sustainability practices. On the other hand, firms in emerging stock markets may lag firms in developed stock markets in sustainable activities. Therefore, ESG standards may not be a critical issue for investors in emerging stock markets. Further, results indicate a positive relation between ROA and returns for both subgroups, while leverage ratio is negatively associated with stock returns of developed indices. Lastly, P/B and P/E do not significantly affect stock price.

The findings will help firms, investors, policymakers, and regulators evaluate the current situation and conclude. To improve their corporate reputation, firms can advertise their socially responsible activities and investments and publish regular reports concerning these activities. In this way, firms can optimise their business processes and create a healthier organisational structure in the long run. Developing an effective strategy for ESG as part of the business strategies can reduce corporate financial risk due to positive investor reaction to the integration of robust sustainability principles and policies (Shakil, 2021: 6). From the standpoint of investors, stocks that attach importance to sustainable investments can be picked to reap higher portfolio returns. Also, this situation may lead other firms to socially responsible investments. Considering the importance of environmentally sustainable projects for countries, direct cash subsidies and tax incentives can be developed by regulators and legislators (Deng & Cheng, 2019: 10). In addition, the authorities may mandate reporting requirements and standards regarding sustainability and corporate governance practices. At the same time, there may be regulations on the methodologies and approaches used by different rating providers in the table. Without standards, the firms' reporting formats and contents and the data type may differ depending on organisational structure. Reports published by companies can be interpreted differently by various data providers, and thence, ESG scores of firms may not be consistent. Dorfleitner et al. (2015) and Brandon et al. (2021) suggest that disagreement between ESG ratings may affect financial and stock market performance differently. Our results also argue that the environmental pillar positively impacts stock returns. In this sense, firms may help to reduce carbon emissions and air pollution in the long term by increasing their investments in environmentally friendly technologies to achieve a greener world.

Finally, this study has some limitations. ESG data were gathered only from the Thomson Reuters database. The findings of the current paper can be extended by using data sets from different data providers. Moreover, 347 firms from developed and emerging stock markets were included in the study. Therefore, a more comprehensive sample can be used for future research, and analyses can be conducted at longer intervals with the increased availability of ESG data. It can also be examined whether firms' different reporting formats

affect stock performance. Investigating the relationship and interaction among the sub-categories of ESG ratings might be another exciting research topic.

References

- Alareeni, B.A. & A. Hamdan (2020), "ESG Impact on Performance of US S&P 500-listed Firms", *Corporate Governance*, 20(7), 1409-1428.
- Amel-Zadeh, A. & G. Serafeim (2018), "Why and How Investors Use ESG Information: Evidence from a Global Survey", *Financial Analysts Journal*, 74(3), 87-103.
- Azmi, W. et al. (2021), "ESG Activities and Banking Performance: International Evidence from Emerging Economies", *Journal of International Financial Markets, Institutions & Money*, 70, 101277.
- Blundell, R. & S. Bond (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models", *Journal of Econometrics*, 87(1), 115-143.
- Brandon, R.G. et al. (2021), "ESG Rating Disagreement and Stock Returns", *Financial Analysts Journal*, 77(4), 104-127.
- Breusch, T.S. & A.R. Pagan (1980), "The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics", *The Review of Economic Studies*, 47(1), 239-253.
- Broadstock, D.C. et al. (2021), "The Role of ESG Performance during Times of Financial Crisis: Evidence from COVID-19 in China", *Finance Research Letters*, 38, 101716.
- Buallay, A. (2019), "Is Sustainability Reporting (ESG) Associated with Performance? Evidence from the European Banking Sector", *Management of Environmental Quality*, 30(1), 98-115.
- Capelle-Blancard, G. & A. Petit (2019), "Every Little Helps? ESG News and Stock Market Reaction", *Journal of Business Ethics*, 157, 543-565.
- Çetenak, E.H. et al. (2022), "ESG (Çevresel, Sosyal ve Kurumsal Yönetim) Skorunun Firma Performansına Etkisi: Türk Bankacılık Sektörü Örneği", *EÜ İİBF Dergisi*, 63, 75-82.
- Deng, X. & X. Cheng (2019), "Can ESG Indices Improve the Enterprises' Stock Market Performance? - An Empirical Study from China", *Sustainability*, 11(17), 1-13.
- Díaz, V. et al. (2021), "Reconsidering Systematic Factors during the Covid-19 Pandemic - The Rising Importance of ESG", *Finance Research Letters*, 38, 101870.
- Dorfleitner, G. et al. (2015), "Measuring the Level and Risk of Corporate Responsibility - An Empirical Comparison of Different ESG Rating Approaches", *Journal of Asset Management*, 16, 450-466.
- Drempetic, S. et al. (2020), "The Influence of Firm Size on the ESG Score: Corporate Sustainability Ratings Under Review", *Journal of Business Ethics*, 167, 333-360.
- Duque-Grisales, E. & J. Aguilera-Caracuel (2021), "Environmental, Social and Governance (ESG) Scores and Financial Performance of Multilatinas: Moderating Effects of Geographic International Diversification and Financial Slack", *Journal of Business Ethics*, 168, 315-334.
- El Khoury, R. et al. (2023), "ESG and Financial Performance of Banks in the MENAT Region: Concavity-Conavity Patterns", *Journal of Sustainable Finance & Investment*, 13(1), 406-430.
- Eliwa, Y. et al. (2021), "ESG Practices and the Cost of Debt: Evidence from EU Countries", *Critical Perspectives on Accounting*, 79, 102097.

- Engelhardt, N. et al. (2021), "ESG Ratings and Stock Performance during the COVID-19 Crisis", *Sustainability*, 13(13), 7133.
- Feng, J. et al. (2022), "ESG Rating and Stock Price Crash Risk: Evidence from China", *Finance Research Letters*, 46, 102476.
- Halbritter, G. & G. Dorfleitner (2015), "The Wages of Social Responsibility - Where Are They? A Critical Review of ESG Investing", *Review of Financial Economics*, 26, 25-35.
- Hausman, J.A. (1978), "Specification Tests in Econometrics", *Econometrica*, 46(6), 1251-1271.
- Keçeli, B. & S. Çankaya (2020), "ESG ve Finansal Verilerin Pay Değerine Etkisi: Kuzey ve Latin Avrupa Ülkeleri Üzerine Bir Çalışma", *İstanbul Ticaret Üniversitesi Girişimcilik Dergisi*, 4(7), 31-49.
- Kim, S. & Z. Li (2021), "Understanding the Impact of ESG Practices in Corporate Finance", *Sustainability*, 13(7), 3746.
- La Torre, M. et al. (2020), "Does the ESG Index Affect Stock Return? Evidence from the Eurostoxx50", *Sustainability*, 12(16), 6387.
- Lokuwaduge, C.S.D.S. & K. Heenetigala (2017), "Integrating Environmental, Social and Governance (ESG) Disclosure for a Sustainable Development: An Australian Study", *Business Strategy and the Environment*, 26(4), 438-450.
- Luo, D. (2022), "ESG, Liquidity, and Stock Returns", *Journal of International Financial Markets, Institutions & Money*, 78, 101526.
- Mohammad, W.M.W. & S. Wasiuzzaman (2021), "Environmental, Social and Governance (ESG) Disclosure, Competitive Advantage and Performance of Firms in Malaysia", *Cleaner Environmental Systems*, 2, 100015.
- Pesaran, M.H. (2004), "General Diagnostic Tests for Cross Section Dependence in Panels", *IZA Discussion Paper Series*, No: 1240.
- Refinitiv (2022), *Environmental, Social and Governance Scores from Refinitiv*, <https://www.lseg.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf>, 25.05.2023.
- Serafeim, G. & A. Yoon (2023), "Stock Price Reactions to ESG News: The Role of ESG Ratings and Disagreement", *Review of Accounting Studies*, 28, 1500-1530.
- Shakil, M.H. (2021), "Environmental, Social and Governance Performance and Financial Risk: Moderating Role of ESG Controversies and Board Gender Diversity", *Resources Policy*, 72, 102144.
- Shanaev, S. & B. Ghimire (2022), "When ESG Meets AAA: The Effect of ESG Rating Changes on Stock Returns", *Finance Research Letters*, 46(A), 102302.
- Shapiro, S.S. & M.B. Wilk (1965), "An Analysis of Variance Test for Normality (Complete Samples)", *Biometrika*, 52(3/4), 591-611.
- Şişman, M.E. & S. Çankaya (2021), "Çevresel, Sosyal ve Kurumsal Yönetişim (ESG) Verilerinin Firmaların Finansal Performansına Etkisi: Hava Yolu Sektörü Üzerine Bir Çalışma", *Çukurova Üniversitesi İİBF Dergisi*, 25(1), 73-91.
- Wooldridge, J.M. (2002), *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: MIT Press.